

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended) A method for addressing packets in a firewall cluster within a single network, the firewall cluster including a plurality of firewall nodes comprising one or more processing units, the method comprising:

selecting, from the firewall cluster within the single network, a first firewall node for processing a first packet, the first firewall node being assigned to a first node number;

receiving, at a first processing unit associated with the first firewall node, the first packet;

modifying, by the first processing unit, ~~as a function of a n-tuple space for representing addresses processed by a set of processing units;~~ a first address for of the first packet into a first modified ~~second address for the first packet;~~ such that a quadrant identifier determined using a hash function and modulo division from the second first modified address being within corresponds to the first node number ~~a range of addresses assigned only to the first firewall node;~~

selecting, from the firewall cluster within the single network, a second firewall node for processing a second packet, the second firewall node being assigned to a second node number;

receiving, at a second processing unit associated with the second firewall node, the second packet, the second processing unit being different than the first processing unit;

modifying, by the second processing unit, as a ~~function of a n-tuple space for representing addresses processed by a set of processing units~~, a second first address for of the second packet into a second modified address ~~for the second packet~~; such that a quadrant identifier determined using a hash function and modulo division from the second modified address being within a range of addresses corresponds to the second node number assigned only to the second firewall node, such that wherein the second modified address of the second packet does not conflict with the second first modified address of the first packet;

forwarding the first packet based on the first modified second address ~~of the first packet~~; and

forwarding the second packet based on the second modified address ~~of the second packet~~.

2. (Cancelled).

3. (Currently Amended) The method of claim 1, further comprising:

assigning to the first firewall node processing unit a first region based on [[the]] a N-tuple space.

4. (Previously Presented) The method of claim 3, further comprising:

using the first address of the first packet, such that the first address represents a point within the first region.

5. (Original) The method of claim 4, further comprising:
using N address values as the N-tuple, such that the N address values represent the point.

6. (Currently Amended) The method of claim 1, further comprising:
using ~~[[the]]~~ a N-tuple space, such that N is equal to a value of at least two.

7. (Currently Amended) The method of claim 3, further comprising:
assigning to ~~[[a]]~~ the second firewall node ~~processing-unit~~ a second region based on the N-tuple space, such that the first region is separate from the second region.

8. (Cancelled).

9. (Cancelled).

10. (Currently Amended) A method for addressing packets associated with a plurality of processing units, each processing unit being associated with one of a plurality of firewall nodes in a firewall cluster within a single network, the method comprising:

selecting, from the firewall cluster within the single network, one of the firewall nodes for processing a packet, the selected firewall node including a first processing unit;

receiving, at the first processing unit, the packet;

reading, at the first processing unit, an N-tuple address of the received packet;
determining, by the first processing unit, whether the N-tuple address of the received packet is within an N-tuple space assigned to the first processing unit based on a quadrant identifier and a firewall node number corresponding to the N-tuple space value assigned to the first processing unit, wherein [[the]] an N-tuple space assigned to each of the plurality of processing units is different, and wherein the quadrant identifier is determined from the N-tuple address using a hash function and modulo division;

sending the packet with the N-tuple address, when it is determined that the N-tuple address is within the N-tuple space assigned to the first processing unit;

determining, when the N-tuple address of the received packet is not within the N-tuple space assigned to the first processing unit, a modified N-tuple address based on the N-tuple space assigned to the first processing unit, such that the modified N-tuple address does not conflict with addresses assigned by any of the other plurality of processing units; and

sending the packet based on the modified N-tuple address.

11. (Original) The method of claim 10, wherein the reading step further comprises:

reading as the N-tuple address, a plurality of values from the received packet.

12. (Original) The method of claim 11, wherein the reading step further comprises:

reading at least a source port.

13. - 16. (Cancelled).

17. (Previously Presented) The method of claim 10, wherein the step of determining the modified N-tuple further comprises:

adding a value to the N-tuple address, such that the modified N-tuple address is within the N-tuple space assigned to the first processing unit.

18. - 20. (Cancelled).

21. (Previously Presented) The method of claim 10, further comprising:
using a computer as the first processing unit.

22. (Previously Presented) The method of claim 10, further comprising:
using a router as the first processing unit.

23. (Cancelled).

24. (Currently Amended) A method of addressing packets in a firewall cluster within a single network, wherein the firewall cluster comprises a set of processing units, each processing unit being associated with a firewall node, the method comprising:

selecting, from the firewall cluster within the single network, one of the firewall nodes for processing a packet, the selected firewall node including a first processing unit;

receiving, at the first processing unit, the packet;

reading, at the first processing unit, an N-tuple address of the received packet;

determining a quadrant identifier based on the read N-tuple address, a hash function, and modulo division;

determining whether the read N-tuple address corresponds to the first processing unit based on the quadrant identifier;

sending the packet with the N-tuple address, when the quadrant identifier corresponds to the first processing unit; [[and]]

determining, when the quadrant identifier does not correspond to the first processing unit, a modified N-tuple address that corresponds to the first processing unit, such that the modified N-tuple address does not conflict with addresses assigned by any of the other processing units; and

sending the packet based on the modified N-tuple address.

25. (Previously Presented) The method of claim 24, further comprising:
assigning each of the set of processing units a firewall node number.

26. (Previously Presented) The method of claim 25, further comprising:
determining whether the N-tuple address corresponds to the first processing unit based on the quadrant identifier and the firewall node number.

27. (Currently Amended) A system for addressing packets in a firewall cluster within a single network, the firewall cluster including a plurality of firewall nodes, the system comprising:

means for selecting, from the firewall cluster within the single network, a first firewall node for processing a first packet, the first firewall node being assigned to a first node number;

means for receiving, at a first processing unit associated with the first firewall node, the first packet;

~~means for modifying, as a function of a n-tuple space for representing addresses processed by a set of processing units,~~ a first address ~~for~~ of the first packet into a first modified second address ~~for the first packet, such that a quadrant identifier determined using a hash function and modulo division from the second first modified address being within a range of addresses corresponds to the first node number~~ assigned only to the first firewall node;

means for selecting, from the firewall cluster within the single network, a second firewall node for processing a second packet, the second firewall node being assigned to a second node number;

means for receiving, at a second processing unit associated with the second firewall node, the second packet, the second processing unit being different than the first processing unit;

~~means for modifying, as a function of a n-tuple space for representing addresses processed by a set of processing units,~~ a second first address ~~of~~ for the second packet

into a second modified address ~~for the second packet, such that a quadrant identifier determined using a hash function and modulo division from the second modified address being within a range of addresses corresponds to the second node number assigned only to the second firewall node, such that wherein~~ the second modified address of the second packet does not conflict with the ~~second~~ first modified address of the first packet;

means for forwarding the first packet based on the first modified ~~second~~ address of the ~~first packet~~; and

means for forwarding the second packet based on the second modified address of the ~~second packet~~.

28. (Currently Amended) A system for addressing packets associated with one or more processing units, each processing unit being associated with a firewall node in a firewall cluster within a single network, the system comprising:

means for selecting, from the firewall cluster within the single network, one of the firewall nodes for processing a packet, the selected firewall node including a first processing unit;

means for receiving, at the first processing unit, the packet;

means for reading, at the first processing unit, an N-tuple address of the received packet;

means for determining whether the N-tuple address of the received packet is within an N-tuple space assigned to the first processing unit based on a quadrant identifier and a firewall node number corresponding to the N-tuple space value assigned

to the first processing unit, wherein the N-tuple space assigned to each of the processing units is different, and wherein the quadrant identifier is determined from the N-tuple address using a hash function and modulo division;

means for sending the packet with the N-tuple address, when it is determined that the N-tuple address is within [[the]] an N-tuple space assigned to the first processing unit; [[and]]

means for determining, when the N-tuple address of the received packet is not within the N-tuple space assigned to the first processing unit, a modified N-tuple address based on the N-tuple space assigned to the first processing unit, such that the modified N-tuple address does not conflict with addresses assigned by any of the other processing units; and

means for sending the packet based on the modified N-tuple address.

29. (Currently Amended) A firewall cluster within a single network including firewall nodes associated with processing units, comprising:

means for selecting, from the firewall cluster within the single network, one of the firewall nodes for processing a packet, the selected firewall node including a first processing unit;

means for receiving, at the first processing unit, the packet;

means for reading, at the first processing unit, an N-tuple address of the received packet;

means for determining a quadrant identifier based on the read N-tuple address, a hash function, and modulo division;

means for determining whether the read N-tuple address corresponds to the first processing unit based on the quadrant identifier;

means for sending the packet with the N-tuple address, when the quadrant identifier corresponds to the first processing unit; [[and]]

means for determining, when the quadrant identifier does not correspond to the first processing unit, a modified N-tuple address that corresponds to the first processing unit, such that the modified N-tuple address does not conflict with addresses assigned by any of the other processing units; and

means for sending the packet based on the modified N-tuple address.

30. (Currently Amended) A system including a firewall cluster within a single network including a plurality of firewall nodes, the firewall nodes being associated with one or more processing units, said system comprising:

at least one memory comprising:

code that selects, from the firewall cluster within the single network, a first firewall node for processing a first packet, the first firewall node including a first processing unit, the first firewall node being assigned to a first node number;

code that receives, at the first processing unit, the first packet;

~~code that modifies, as a function of a n-tuple space for representing addresses processed by a set of data processing units, a first address for~~ of the first packet into a second first modified address for the first packet, such that a quadrant identifier determined using a hash function and modulo division from

the second first modified address being within a range of addresses corresponds to the first node number assigned only to the first firewall node;

code that selects, from the firewall cluster within the single network, a second firewall node for processing a second packet; the second firewall node including a second processing unit, the second firewall node being assigned to a second node number;

code that receives, at the second processing unit, the second packet, the second processing unit being different than the first processing unit;

code that ~~modifies as a function of a n-tuple space for representing~~ addresses ~~processed by a set of processing units~~; a first second address for of the second packet into a second modified address for the second packet; such that a quadrant identifier determined using a hash function and modulo division from the second modified address being within a range of addresses corresponds to the second node number assigned only to the second firewall node, ~~such that wherein~~ the second modified address of the second packet does not conflict with the second first modified address of the first packet;

code that forwards the first packet based on the first modified second address of the first packet; and

code that forwards the second packet based on the second modified address of the second packet; and

at least one processing unit for executing the code.

31. (Currently Amended) A system including a firewall cluster within a single network including a plurality of firewall nodes, the firewall nodes being associated with processing units, the system comprising:

at least one memory comprising:

code that selects, from the firewall cluster within the single network, one of the firewall nodes for processing a packet, the selected firewall node including a first processing unit;

code that receives, at the first processing unit, the packet;

code that reads, at the first processing unit, an N-tuple address of the received packet;

code that determines whether the N-tuple address of the received packet is within an N-tuple space assigned to the first processing unit based on a quadrant identifier value and a firewall node number corresponding to the N-tuple space assigned to the first processing unit, wherein [[the]] an N-tuple space assigned to each of the processing units is different, and wherein the quadrant identifier is determined from the N-tuple address using a hash function and modulo division;

code that sends the packet with the N-tuple address, when it is determined that the N-tuple address is within the N-tuple space assigned to the first processing unit;

code that determines, when the N-tuple address of the received packet is not within the N-tuple space assigned to the first processing unit, a modified N-tuple address based on the N-tuple space assigned to the first

processing unit, such that the modified N-tuple address does not conflict with addresses assigned by any of the other processing units; and

code that sends sending the packet based on the modified N-tuple address; and

at least one processing unit for executing the code.

32. (Original) The system of claim 31, wherein code that reads further comprises:

code that reads as the N-tuple address, a plurality of values from the received packet.

33. (Original) The system of claim 32, wherein code that reads the plurality of values further comprises:

code that reads at least a source port.

34. - 36. (Cancelled).

37. (Currently Amended) A firewall cluster including a plurality of firewall nodes within a single network, the firewall nodes being associated with processing units, the firewall cluster comprising:

at least one memory comprising

code that selects, from the firewall cluster within the single network, one of the firewall nodes for processing a packet, the selected firewall node including a first processing unit;

code that receives, at the first processing unit, the packet;

code that reads, at the first processing unit, an N-tuple address of the received packet;

code that determines a quadrant identifier based on the read N-tuple address, a hash function, and modulo division;

code that determines whether the read N-tuple address corresponds to the first processing unit based on the quadrant identifier;

code that sends the packet with the N-tuple address, when the quadrant identifier corresponds to the first processing unit; [[and]]

code that determines, when the quadrant identifier does not correspond to the first processing unit, a modified N-tuple address that corresponds to the first processing unit, such that the modified N-tuple address does not conflict with addresses assigned by any of the other processing units; and

code that sends the packet based on the modified N-tuple address; and

at least one processing unit for executing the code.

38. (Currently Amended) A computer-readable storage medium comprising instructions which, when executed by a processing unit, perform a method for

addressing packets in a firewall cluster within a single network, the firewall cluster including a plurality of firewall nodes, the method including:

selecting, from the firewall cluster within the single network, one of the firewall nodes for processing a packet, the selected firewall node being associated with a first processing unit;

receiving, at the first processing unit, the packet;

reading, at the first processing unit, an N-tuple address of the received packet;

determining whether the N-tuple address of the received packet is within an N-tuple space assigned to the first processing unit based on a quadrant identifier and a firewall node number corresponding to the N-tuple space value assigned to the first processing unit, wherein an N-tuple space assigned to each of the processing units is different, and wherein the quadrant identifier is determined from the N-tuple address using a hash function and modulo division;

sending the packet with the N-tuple address, when it is determined that the N-tuple address is within the N-tuple space assigned to the first processing unit; and

determining, when it is determined that the N-tuple address of the received packet is not within the N-tuple space assigned to the first processing unit, a modified N-tuple address based on the N-tuple space assigned to the first processing unit, such that the modified N-tuple address does not conflict with addresses assigned by any of the other processing units; and

sending the packet based on the modified N-tuple address.

39. (Previously Presented) The computer-readable storage medium of claim 38, wherein reading further comprises:

reading as the N-tuple address, a plurality of values from the received packet.

40. (Previously Presented) The computer-readable storage medium of claim 39, wherein reading the plurality of values further comprises:

reading at least a source port.

41. - 43. (Cancelled).

44. (Currently Amended) A computer-readable storage medium comprising instructions which, when executed by a processing unit, perform a method for addressing packets in a firewall cluster within a single network, the firewall cluster including a plurality of firewall nodes, the method including:

selecting, from the firewall cluster within the single network, one of the firewall nodes for processing a packet, the selected firewall node including a first processing unit;

receiving, at the first processing unit, the packet;

reading, at the first processing unit, an N-tuple address of the received packet;

determining a quadrant identifier based on the read N-tuple address, a hash function, and modulo division;

determining whether the read N-tuple address corresponds to the first processing unit based on the quadrant identifier;

sending the packet with the N-tuple address, when the quadrant identifier corresponds to the first processing unit; [[and]]

determining, when the quadrant identifier does not corresponds to the first processing unit, a modified N-tuple address that corresponds to the first processing unit, such that the modified N-tuple address does not conflict with addresses assigned by any of the other processing units; and

sending the packet based on the modified N-tuple address.

45. (Currently Amended) A computer-readable storage medium comprising instructions which, when executed by a processing unit, perform a method for addressing packets in a firewall cluster within a single network, the firewall cluster including a plurality of firewall nodes comprising one or more processing units, the method including:

selecting, from the firewall cluster within the single network, one of the firewall nodes within the single network for processing a first packet, the selected firewall node being associated with a first processing unit and assigned to a first node number;

receiving, at the first processing unit, the first packet;

~~modifying, as a function of a n-tuple space for representing addresses processed by a set of data processing units,~~ a first address ~~of~~ for the first packet into a second first modified address ~~for the first packet, such that a quadrant identifier determined using a hash function and modulo division from the second first modified~~ address corresponds to the first node number ~~being within a range of addresses assigned only to the selected~~ firewall node;

selecting, from the firewall cluster within the single network, a second firewall node for processing a second packet, the second firewall node being assigned to a second node number;

receiving, at a second processing unit associated with the second firewall node, the second packet, the second processing unit being different than the first processing unit;

modifying, by the second processing unit, ~~as a function of a n-tuple space for representing addresses processed by a set of processing units,~~ a first second address ~~for~~ of the second packet into a second modified address ~~for the second packet, such that a quadrant identifier determined using a hash function and modulo division from the second modified address being within a range of addresses corresponds to the second node number assigned only to the second firewall node, such that wherein the second modified address of the second packet does not conflict with the second first modified~~ address of the first packet;

forwarding the first packet based on the first modified ~~second~~ address ~~of the first packet;~~ and

forwarding the second packet based on the second modified address ~~of the second packet.~~